BC hydro

Proposal for the FRASER VALLEY SUBSTATION AND PUGET SOUND POWER AND LIGHT INTERTIE STUDY

October 1989

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Proposal
Fraser Valley Substation and
Puget Sound Power and Light Intertie Study

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INTRODUCTION

B.C. Hydro presently operates a high voltage transmission line corridor running generally in an east/west direction through the Fraser Valley. The corridor has two 500 kV (kilovolt) transmission lines and one 230 kV line. While the two 500 kV lines carry electricity from the B.C. interior to the Ingledow substation in the Lower Mainland, electricity on the 230 kV line supplies the Fraser Valley through a number of 230 kV substations along the line. The Clayburn 230 kV substation, located in Matsqui, is the one that distributes electricity to customers in the Abbotsford, Matsqui and Aldergrove areas.

B.C. Hydro is presently examining two related concerns which could affect the existing Fraser Valley transmission corridor.

The first issue is the need for a new 500-230 kV transformer substation to meet the growing demand for electricity in the central Fraser Valley. The new substation would tap into one of the 500 kV lines located in the existing transmission line corridor to meet the growing need for electricity in tne Abbotsford, Matsqui and Aldergrove areas.

Secondly, Puget Sound Power and Light Company (PSPL), an American utility based in Bellevue Washington, has asked Hydro to join it in technical studies and licensing activities for a new transmission line intertie connecting the two systems across the Canada/U.S. border. If we proceed, Hydro would build a new line from its Fraser Valley corridor south to the border. Contracts for electricity to serve PSPL's needs would be negotiated by Powerex, a wholly owned Hydro subsidiary responsible for dealing with all export sales.

Because of the interdependency of these two concerns, Hydro is studying them as a single project.

STUDY RATIONALE

Each of the two portions of the project has its own rationale.

Fraser Valley Substation

Demand for electricity in the Fraser Valley is growing. As demand grows, additional support for the transmission/distribution system is required. The capacity of the existing 230 kV line is not sufficient to meet the expected load growth. Access to electricity on one of the two 500 kV lines is needed. Current load forecasts suggest a new 500-230 kV substation is needed along the line to support the Fraser Valley distribution system in the early to mid 1990's. The need for a new substation exists whether or not an intertie is constructed.

PSPL Intertie

An additional transmission line would also allow Powerex to sell electricity directly from the B.C. Hydro transmission system to PSPL. Initially, during high water periods, when excess generating capacity exists at Hydro dams, surplus non-firm (i.e. interruptible) power could be sold to PSPL on a day to day basis. In the future it would be possible to also sell firm power (i.e. non interruptable) from new resources developed for export by independent power producers in B.C.

REGULATORY APPROVAL

Regulatory approval by the National Energy Board is required for the construction and the operation of the intertie transmission line and for the export of electricity. Hydro must also apply to the Provincial Minister of Energy, Mines and Petroleum Resources and to the B. C. Utilities Commission for regulatory approval.

Puget Sound Power and Light has submitted an initial application to the appropriate American authorities for regulatory approval.

If Canadian and American regulatory authorities approve the project, construction of the transmission line and associated station facilities could proceed.

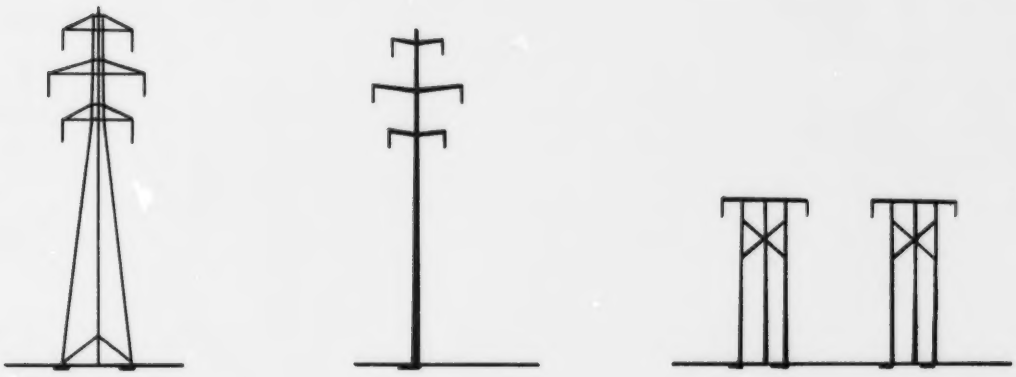
If the 500-230 kV substation is used as the connection point for the new intertie line, it will require approval as part of the project. If, however, the substation is not used as the connection point for the intertie line, separate application for its construction will be made only to the provincial regulatory authorities.

STUDY DESCRIPTION

The study includes a new 500/230 kV substation in the central Fraser Valley. Clayburn substation has been proposed as a possible location for this new facility.

The study also includes construction of two 230 kV circuits travelling in a north/south direction from the Fraser Valley transmission corridor at the north end to the U.S. border at the south end. The line would be located somewhere between 240th Street west of Aldergrove and the Sumas Prairie area of Abbotsford. Depending on its location within this study area the new line could be as short as three kilometers or as long as eight kilometers. The configuration of the line has not yet been determined, nor have the types of structures from which the line will be suspended. However, considering current technology, the two most likely options would be a double circuit configuration (where the two circuits are suspended from a single set of steel support structures) or two single circuits side by side (where each circuit is suspended from its own set of structures; typically of wood pole construction).

FIGURE #1
Basic Transmission Structure Types



Double Circuit
Steel Lattice Towers

Double Circuit
Steel Aesthetic Structures

Two Single
Circuits

The proposed transmission line would be capable of transmitting up to 800 megawatts (MW) of electricity per circuit. Although the amount of surplus electricity that B.C. Hydro would have available for export would depend on water levels at any given point in time, it is anticipated that non-firm surplus exports to PSPL would initially take up only a portion of that capacity.

The excess capacity in the two lines would be used for:

- **line outages** - although either circuit is capable of transmitting the required electricity, the second circuit provides a safety factor in case one circuit is out of service for any reason;
- **economics/efficiency** - operating the lines at less than capacity reduces line loss and, therefore, reduces wastage;
- **system security** - in case of short term emergency situations on either side of the border;
- **long term needs** - planning for electricity needs in the Pacific Northwest must consider options beyond the five to ten year period.

Once the location of the transmission line has been chosen, the issue of connecting the line to the corridor and the planning for the new 500-230 kV substation can be addressed. Where the proposed new line connects with the Fraser Valley transmission corridor, a junction box of some kind (called a station) would be required. At that point the two options would be to connect to the existing 230 kV line or connect to one of the existing 500 kV lines.

Connecting to the 230 kV Line

If the new line connects with the 230 kV line in the corridor west of Clayburn substation, (see Figure #2, Option 1) a simple switching station would be required. Also, if the connection to the 230 kV line is made east of Clayburn, a 230 kV substation would be required (Figure #2, Option 2). However, in this case, another 230 kV line would be required in the existing Fraser Valley transmission corridor connecting this new 230 kV substation to Clayburn. If the new line connects directly at Clayburn, use would be made of the existing station facilities (Figure #2, Option 3).

In all three of the above cases, the existing 230 kV line could not be connected to the proposed line unless a new 500-230 kV substation were built somewhere along the existing corridor to reinforce the Fraser Valley system. This substation will be required in the future to serve increasing demand in any case, but connecting a new intertie to the existing 230 kV line would make the new 500-230 kV transformer substation mandatory.

Connecting to one of the 500 kV Lines

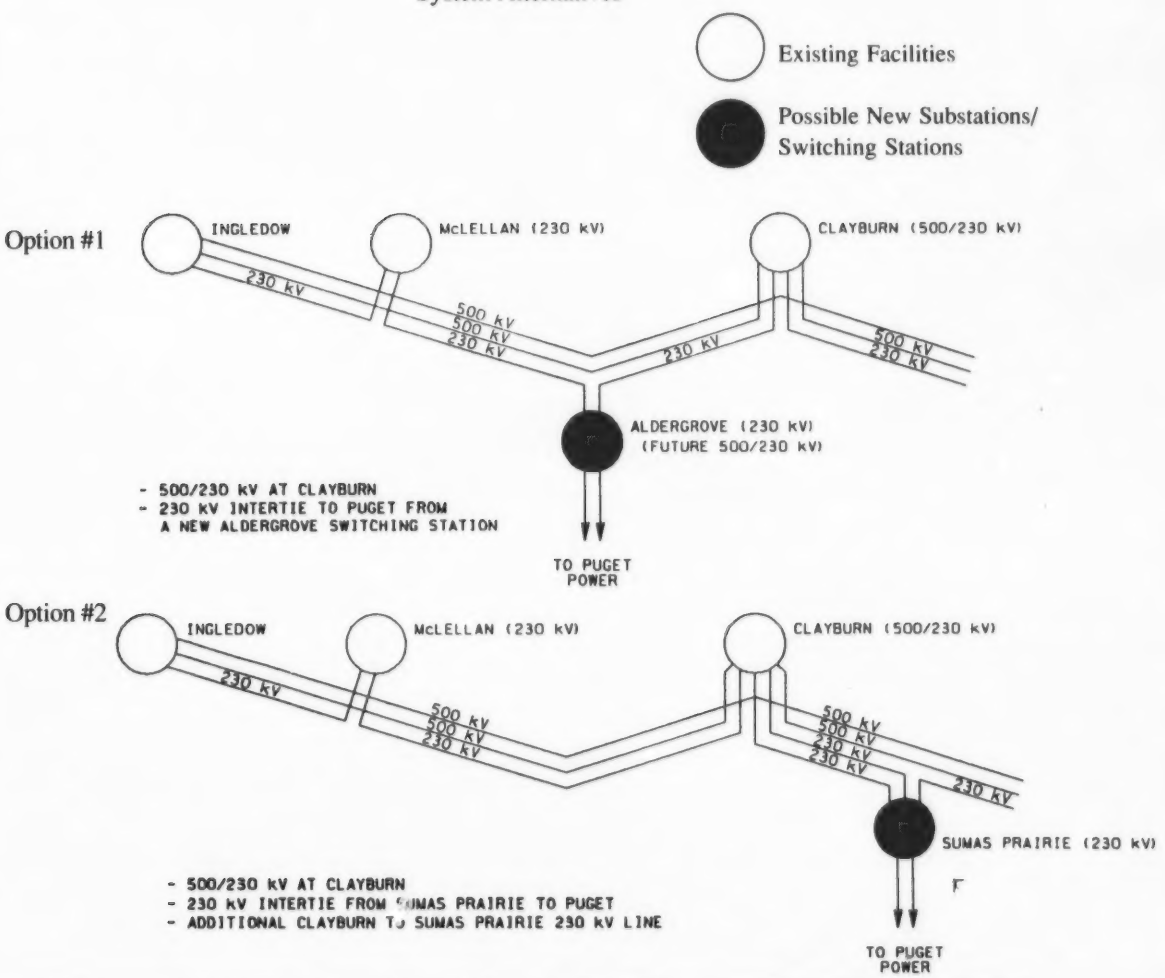
Alternatively, the new intertie line could tie into one of the existing 500 kV lines in the corridor at a new 500-230 kV transformer substation. This substation would also use electricity on the 500 kV line to reinforce the Fraser Valley distribution system (Figure #2, Options 4 and 5).

The 500-230 kV transformer substation would require an area of approximately 300 metres x 400 metres. Clayburn substation is already sized for expansion as a 500-230 kV substation and, therefore, becomes one possible option for its location. A 500-230 kV substation located at Clayburn would require at least one of the existing 500 kV lines to be to be connected to the substation from the corridor 1/2 kilometre south of the station.

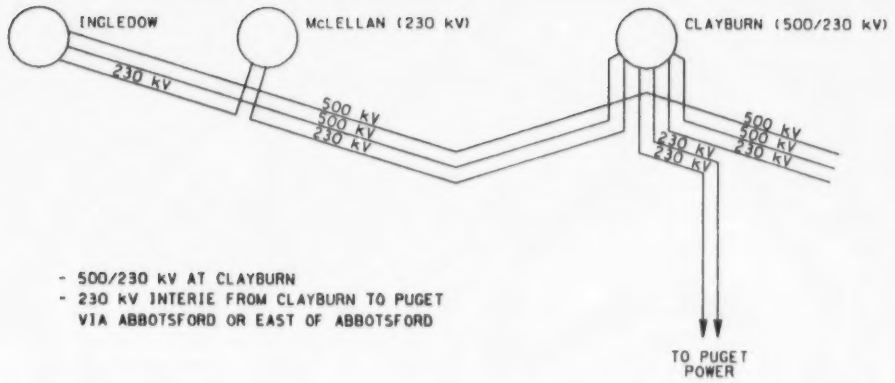
If a new site is required for the substation, between one third and one half of the substation could be located within the existing transmission line corridor with the remainder located adjacent to it.

The projected cost for the line and associated facilities is in the order of 30-40 million dollars depending on route options and other issues.

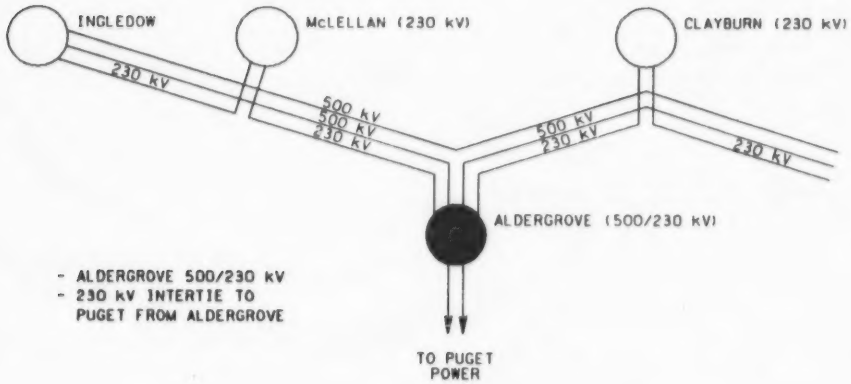
Figure #2
System Alternatives



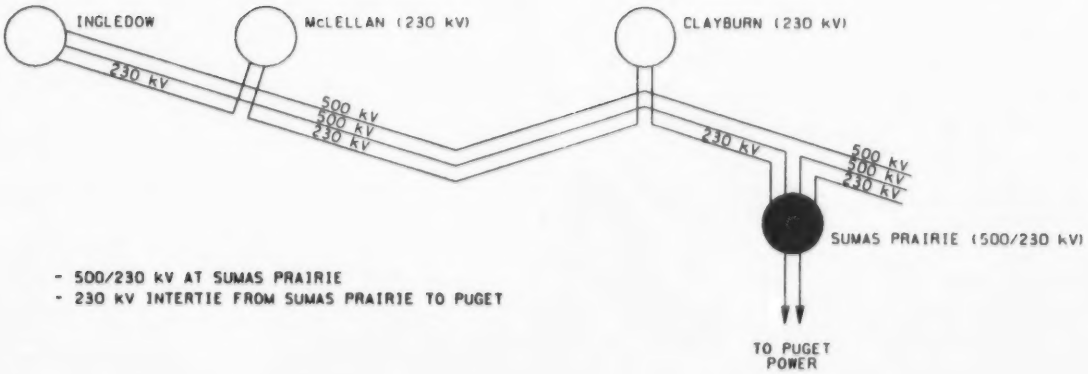
Option #3



Option #4



Option #5



ROUTE PLANNING FOR THE INTERTIE

The route for the transmission line intertie has not yet been selected. Initial planning suggests the line cannot be built within approximately three kilometre of the Abbotsford airport, or within approximately 1.5 kilometre of the airport outer beacon located off 264th Street in Langley. Similarly, land use and aesthetic considerations eliminate a new corridor through the urban concentration of Abbotsford and Matsqui. If these assumptions are correct the possible north/south study areas identified to date are shown on figure #3.

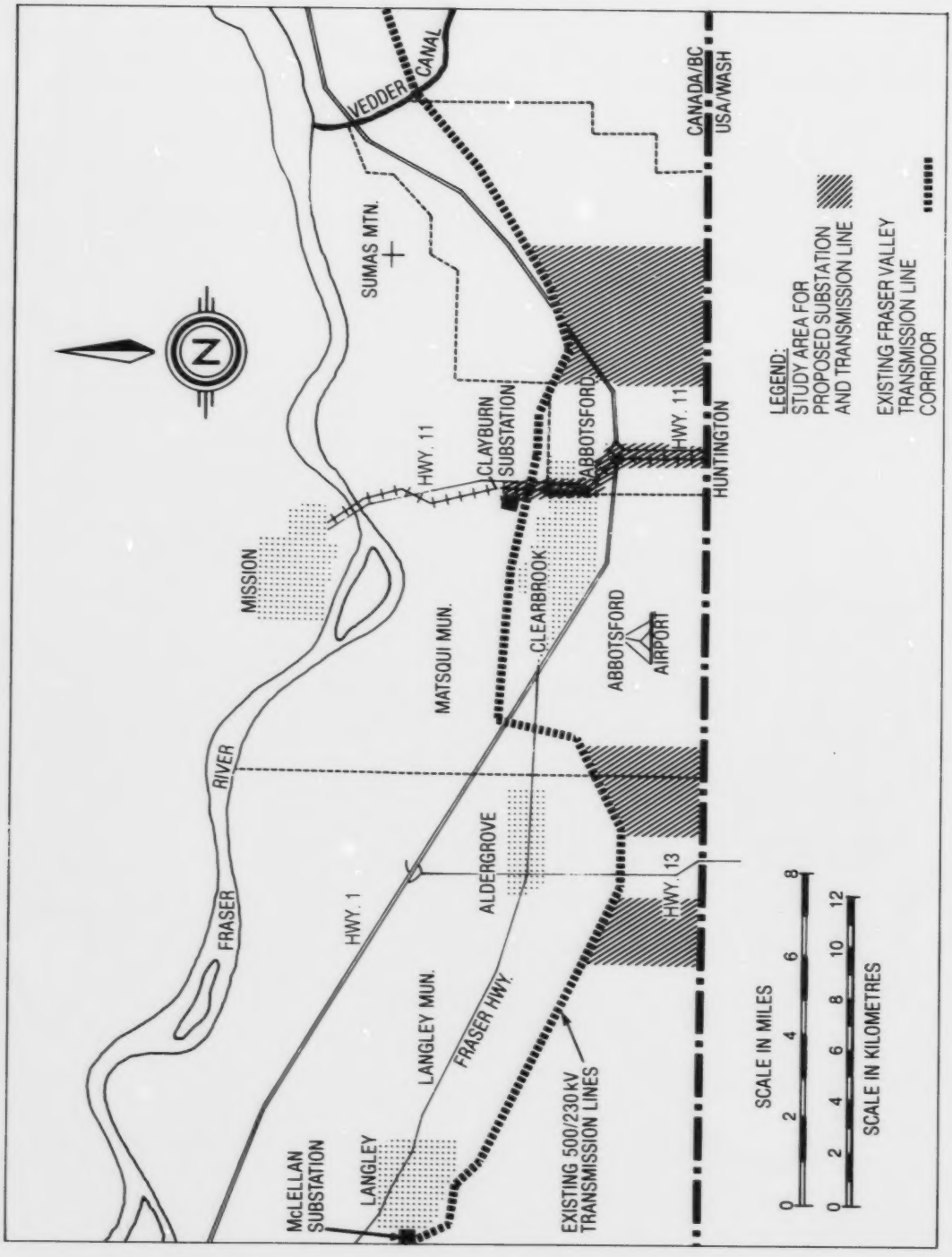
Various technical, environmental and social impact studies currently underway will provide more information about these potential corridors. Public input to the route analysis process will also be sought as part of the Public Consultation Program.

PROPOSED STUDY SCHEDULE

Project Step	Target Completion Date
Planning & Development Study	
- Environmental Studies	December 1989
- Technical Studies	December 1989
- Public Consultation (first phase)	December 1989
Project Application (pending study results) Spring 1990	
Project Approval (projected)	Late 1990
Engineering & Survey	1990-91
Construction 1992-93	
In Service Date	Late 1993

This schedule may change as new information is obtained or decisions are made about the project. B.C. Hydro will inform the public about any changes to the schedule as the project unfolds.

Figure #3
Study Area



PUBLIC CONSULTATION PROGRAM

B.C. Hydro is committed to a comprehensive Public Consultation Program as a means to enhance the planning and design of this project. Public consultation for the Fraser Valley substation and PSPL Intertie is designed to achieve three objectives.

1. Provide as much information as is reasonably possible about the project to interested parties;

2. Incorporate ideas and concerns from interested parties into the planning process and specifically incorporate public input to the analysis of route options for the Intertie;

3. Report back to the general public the input received and how that input has been used in the planning process.

Key steps in the public consultation process include:

	Activity	**Target Completion Date**
1)	Project Announcement	August 20
2)	Development of a project mail list used to send information to interested parties as it becomes available	Ongoing
3)	Interest Group Meetings	October 1989
4)	Initial Public Meetings	October 1989
5)	Public Workshops on Project Issues	November 1989
6)	Public Meetings to present strategies to address issues raised by the public	December 1989

The Public Consultation Program is designed to incorporate public comments and ideas into the project planning process. Potential concerns that will need to be addressed include route identification, environmental impacts, line configuration and design, substation location and planning. Any other concerns raised by the public will be considered and every effort will be made to address all comments and concerns. The results of the public participation process will be documented and presented as part of B.C. Hydro's application for license to the B.C. Utilities Commission and the National Energy Board of Canada.

An information line has been set up to answer public inquiries concerning this and other Hydro projects. Interested persons can call 1-800-663-1377 or, in the Lower Mainland, call 663-3614.